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Article

Evaluating the Effects of Vanadyl Sulfate on Biomarkers of Oxidative Stress and Inflammation in Renal Tissue of Rats with Diabetes Type 2

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Vanadyl Sulfate (VS) is an ingredient in some food supplements and experimental drugs. This study was designed to assay the effects of VS on biomarkers of oxidative stress and inflammation in renal tissue of rats with diabetes type 2. 30 male Wistar rats were divided into three equal groups as follow: non-diabetics, non-treated diabetics and VS-treated diabetics. Diabetes type 2 has been induced through high fat diet and fructose in the animals. Diabetic rats were treated with 25 mg/kgBW of VS in water for 12 weeks. At the end of study, glucose and insulin were measured using commercially available kits in serum and biomarkers of oxidative stress and inflammation in renal homogenates of animals were measured by related methods. Compared to controls, glucose and insulin were increased significantly in non-treated diabetic rats (*p-value <0.05*) that showed the induction of diabetes type 2 in rats. The results showed that in VS-treated diabetic rats compared to the non-treated diabetic group, vanadyl sulfate significantly reduced the glucose and insulin secretion and changed renal inflammatory and oxidative markers, except protein carbonyl so that we couldn't find any significant changes. Our study showed that vanadyl supplementation had positive effects on oxidative stress and inflammation biomarkers in kidney of diabetic rats.

Keywords: Vanadyl Sulfate, IL-1, IL-10, Oxidative Stress, Inflammations.

INTRODUCTION

Hyperglycemia can lead to diabetic problems and their socio-economic burden. Various tissues which have been exposed to high concentration of glucose may lead to changes in cell signaling, increment of oxidizing species or significant reduction in antioxidant capacity. Also, hyperglycemia has critical role in Advanced Glycation End products (AGEs) formation, as well as, secretion of the pro-inflammatory cytokines and cellular death (Volpe *et al*., 2018). Diabetic Kidney Disease (DKD) is one of the most common complications of diabetes, and its severity has increased throughout the world over the last decade due to the growing trend of diabetes, as it is becoming a major cause of death and mortality (Li, Ma, 2017; Liang, Cai, Chen, 2017). It has been documented that trace elements are required for proper function of metabolic pathways (Panchal, Wanyonyi, Brown, 2017; Mirhashemi, Aarabi, 2011). Vanadium, the 3d transition metal, has been considered as micro supplements for various biological functions in humans (Petanidis *et al*., 2013; Pessoa *et al*., 2015; Levina, Lay, 2017). Main attention to vanadium has focused on anti-diabetic effects but shifted to anti-cancer and anti-parasitic drugs (Levina, Lay, 2017; Kioseoglou *et al*., 2015). Vanadyl sulfate has been used in humans in the form of insulin-mimetic salt and thus controls both DM type 1 and type 2. Vanadyl sulfate protects

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